Cardiac output, arterial elastance, left ventricular end-diastolic pressure (LVEDP) and end-systolic volume showed no obvious changes. Little changes occurred in ejection fraction except that there was a decreasing in acute exhaustive rats. There were no significant differences between two groups at dp/dt_{max}, stroke work and the slope of the end-systolic P-V relation (ESPVR). The parameters used to evaluate the diastolic including Tau, $-dp/dt_{min}$ and the slope of the end- diastolic P-V relation (EDPVR). Tau was 15.89±3.53 ms in acute exhaustive group increased obviously ($P<0.01$) compared with 6.49±1.26 ms in Control group. P-V loops moved to the right and down portion of the coordinate system.
Conclusions: Epinephrine and norepinephrine increase compensatorily after exhaustive swimming. Exhaustive swimming induces acute exhaustive lesion both in systolic function and diastolic function in rats.

GW25-e3504

The effect of Ginsenoside Rb1 on the brain of aging mouse and mTOR/p70S6K pathway

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Objectives: To observe the effect of Ginsenoside Rb1 on the brain tissue of natural aging mouse, as well as to explore the connection between Rb1 and mTOR/p70S6K pathway.
Methods: Twenty-seven mice were obtained from the Animal Experiment Center of Sun Yat-sun University. Four-month-old mice was termed as the young group (n=7), and 22-month-old mice was as the old groups (n=20). PBS was administered intraperitoneally to the young group, and old groups were injected intraperitoneally with PBS (old controls), low dose (10mg/kg) Rb1 and high dose (20mg/kg) Rb1, respectively. The mice were sacrificed 6 weeks after intraperitoneal administration. Mice brain tissues were obtained to examine the activity of MAO and the protein expression of Plasminogen activator inhibitor 1 (PAI-1), P-mTOR/ mTOR (Mammalian Target Of Rapamycin) and P-p70S6K/ p70S6K.
Results: In the brain tissues of old controls, the activity of MAO and expression of PAI-1 were increased significantly, with a high phosphorylation level of mTOR and its target p70S6K, compared with young group. However, the activity of MAO and phosphorylation level of mTOR were decreased in brains of both Rb1 group mice; Furthermore, obvious decrease in the expression of PAI-1 and phosphorylation level of p70S6K of high-dose-group mice brain was observed, compared with old controls.
Conclusions: Ginsenoside Rb1 prevents mice against natural aging-related changes in activity of MAO and expression of PAI-1, and high-dose group was superior to low-dose group. The anti-aging effect of Ginsenoside Rb1 is highly associated with mTOR/p70S6K pathway.

GW25-e4167

QiShen YiQi Pills ameliorates ventricular fibrosis and dysfunction via regulation the expression of matrix metalloproteinase-9 and tissue inhibitor of metalloproteinase-1 in the isoproterenol-induced myocardial fibrosis rats

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Objectives: QiShen YiQi Pills (QSYQ) is a compound Chinese medicine used for treatment of cardiovascular diseases, and can inhibit cardiac fibrosis in left ventricle hypertrophy. This study was to investigate the potential antifibrotic effects and mechanisms of QSYQ in the isoproterenol- induced myocardial fibrosis in rats.
Methods: We studied a normal control group and 2 groups of rats undergoing isoproterenol-induced myocardial fibrosis 1 week prior to treatment: isoproterenol (ISO) group, and ISO combined with QSYQ (ISO+QSYQ) group. The rats of ISO and ISO+QSYQ group were received ISO (120 mg/Kg BW) by subcutaneous injection at two consecutive days. After 7d for ISO treatment, Vehicle (water) or QSYQ (250mg/kg/d) was administered by gavage for 28d. After treatment for successive 28 days, hemodynamic parameters were measured by echocardiography and the histopathological changes of cardiac tissue was observed via hematoxylin/eosin and Masson's trichrome reagent staining. The expression of matrix metalloproteinases (MMP-9), tissue inhibitor of matrix metalloproteinase 1 (TIMP-1), collagen I and III in left and right ventricle (LV and RV) tissues was detected by Western blot.
Results: QSYQ significantly improved left systolic functions, resulting in improved LV ejection fraction (74.9±3.95% *vs* 61.2±4.14%; $P<0.01$), fractional shortening (44.9±3.58% *vs* 37.7±2.67%; $P<0.01$), LV internal dimension in systole ($P<0.05$). Masson's trichrome staining in ISO treated group reveals increased cardiac interstitial fibrosis (10.52%±0.98%), while treatment with QSYQ resulted in reversal of myocardial fibrosis (7.07%±0.82%). QSYQ also obviously reduced the expression of collagen I and III content in the whole LV and RV tissues respectively. QSYQ treated rats decreased remarkably the expression of MMP9 and TIMP-1 in LV and RV tissues as compared with the rats in ISO treated group.
Conclusions: QSYQ can improves cardiac function and prevents cardiac remodeling in the late stage after ISO induced myocardial fibrosis, and the mechanisms maybe associate with regulate MMP-9/TIMP-1 imbalance in ventricle tissue of rat heart. It obviously suggests that QSYQ may be considered an antifibrotic drug for the improvement of post-MI myocardial dysfunction and remodeling.

GW25-e4240

Resveratrol prevention of diabetes-induced cardiorenal damage was associated with the suppression of oxidative stress and inflammation: roles of Nrf2 and NF-κB

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Objectives: Cardiorenal complications are common and serious complications in diabetes. Oxidative stress plays an important role in diabetes-induced cardiorenal damage and pathogenesis. Nuclear factor E2-related factor-2 (Nrf2) is a transcription factor antioxidant to oxidative stress, and nuclear factor-κB (NF-κB) is pathogenically significant in inflammation. In the present study, we tested whether Resveratrol (RSV) can protect heart and kidney from diabetes, if so, whether the cardiorenal protection by RSV is associated with Nrf2 and NF-κB.
Methods: Type 1 diabetes was induced in FVB mice by multiple low-dose streptozotocin. Diabetic and age-matched control mice were treated with or without RSV by oral gavage at 10 mg/kg/day for 12 weeks. Hearts and kidneys from these mice were respectively assessed for fibrosis, inflammation, oxidative damage, and Nrf2 expression and transcription by immunohistochemical staining and real-time PCR method.
Results: Diabetes induced significant increases in oxidative stress and inflammation in the hearts and kidneys at 3 months. RSV attenuated these diabetic cardiorenal pathogenic changes, significantly up-regulated the expression of Nrf2 and its down-stream antioxidants, and also down-regulated the expression of NF-κB and mediated inflammation.
Conclusions: The cardiorenal protection from diabetes by RSV was associated with the up-regulation of Nrf2 and its downstream antioxidants, also associated with down-regulation of NF-κB.

GW25-e4276

The mechanism of Wenxin Granule prevention on ventricular arrhythmia during acute myocardial ischemia and reperfusion

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Objectives: Wenxin granule (WXG), a Chinese herbal compound, has been widely applied in protecting myocardial cells and reducing ventricular arrhythmia (VA) after myocardial infarction. Its mechanism of preventing ischemic ventricular arrhythmia, however, is less well-established. Since connexin 43 (Cx43) has been proposed to be involved in VA's protection, the present study analyzed whether WXG prevent VA during acute myocardial ischemia and reperfusion by up-regulating Cx43 expression and decreasing heterogeneity and lateralization of Cx43 distribution.
Methods: Sixty male Wistar rats were randomly divided into sham group (N=15), control group (N=15), low dosage group with 2.43g WXG per kg of body weight (N=15), high dosage group with 9.72g WXG per kg of body weight (N=15). WXG was administrated by gastric perfusion. Besides sham group, left descending anterior coronary artery in other groups were subjected to 30 min of regional ischemia and 2 h of reperfusion. Each rats was monitored by electrocardiogram machine, and arrhythmia scores were assigned during the ten 3-min intervals of myocardial ischemia. The tissue specimen was then evaluated by immunohistochemistry and Western blot.
Results: WXG significantly reduced ventricular arrhythmic events (ventricular tachycardia times per minute respectively in control group, low dose group and high dose group: 5.86 ± 1.28, 4.14 ± 0.67 and 2.17 ±0.80, $P<0.001$; ventricular fibrillation times per minute respectively in control group, low dose group and high dose group: 1.13 ± 0.44, 0.44 ± 0.23 and 0.06±0.01, $P<0.001$) and shortened duration of arrhythmia ($P<0.001$). Additionally, Control animals had an average arrhythmia score of 5.40 ± 1.22. WXG compared with the control group significantly reduced the arrhythmia score during 30 min of ischemia (low dose and high dose group, 3.21 ± 0.65 and 2.42 ± 0.32; $P<0.001$). HE staining showed WXG could decrease the infarct size and attenuated cardiomyocyte apoptosis. More heterogeneous and lateralized Cx43 distribution was observed in control group compared with WXG group. Western blot showed less expression of Cx43 in control group, and there was a significant association between WXG dose and reduced VA's events ($P<0.001$).
Conclusions: WXG prevent VA during acute myocardial ischemia and reperfusion by up-regulating Cx43 expression and decreasing heterogeneity and lateralization of Cx43 distribution.

GW25-e0589

A comparison of the efficacy of renal denervation and pharmacologic therapies in post-myocardial infarction heart failure

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Objectives: Renal denervation (RD) has been shown to be effective in treating post-myocardial Infarction (MI) heart failure (HF) in animal models and clinical trials. This study was designed to further assess the difference of effectiveness and safety between RD and conventional medicine therapy in rats with post-MI HF.
Methods: Rats were randomly assigned into seven experimental groups: N group (control group with no MI and no RD, n=10), MI group (MI, n=20), RD group (renal

denervation, n=10), RD-3d+MI group (RD performed three days before MI, n=15), Metoprolol-3d+MI group (Metoprolol treated three days before MI, n=15), ACEI-3d+MI group (Perindopril treated three days before MI, n=15), and ARB-3d+MI group (Losartan treated three days before MI, n=15). Cardiac function, autonomic nervous system parameters (HRV), and neuroendocrine activities (plasma renin, angiotensin II, aldosterone and norepinephrine Levels) were evaluated 8 weeks post MI.
Results: Ten of 20 animals in the MI group, 5 of 15 in the RD-3d+MI group, 5 of 15 in the metoprolol-3d+MI group, 7 of 15 in the ACEI-3d+MI group and 8 of 15 in the ARB-3d+MI group died within the eight week period after coronary artery ligation. The death rates of the RD-3d+MI group and the metoprolol group were the same and much less than the MI, ACEI, or ARB groups ($P<0.05$). The death rate did not differ between the latter three groups. None in the control and RD group died during the experiment. There were no significant differences in body weight or the infarct size among all experimental groups eight weeks post-MI. The results showed that the physiologic benefits of RD on improving cardiac remodeling and function, water and sodium excretion, autonomic modulation and suppression of RAAS activation were significantly better than any of the three drugs alone and had no effect on normal controls.
Conclusions: In this post-MI HF animal model, surgical RD provides effective autonomic modulation, inhibition of the RAAS, improved cardiac remodeling, and preserved renal function, without affecting normal circulation and cardiopulmonary function in normal rats. Compared to metoprolol, ACEI, and ARB single drug therapies, RD alone is more efficacious. These results suggest that RD may be an effective treatment option for HF, especially in patients who have contraindications to drug therapy.

GW25-e0746

Technique of synchronous culture of endothelial progenitor cells and Smooth muscle cell derived rabbit bone narrow

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Objectives: To isolate rabbit bone marrow-derived mononuclear cell then synchronous culture rabbit endothelial progenitor cells (EPCs) and smooth muscle progenitor cells (SPCs), study their biological properties and assess the possibility as the seed cells for tissue-engineered venous valves.
Methods: Density gradient centrifugation was used to obtain bone marrow blood mononuclear cells, which were separately cultured with EGM-2 complete medium containing 5% FBS to be induced to EPC and with EBM-2 medium without VEGF containing 5% FBS, 20ng/ml PDGF-BB for SPC induction.
Results: EPCs were cultured for 10 days and the cells fused as monolayer, showing a "stepping stone" appearance and expressing VEGFR-2, vWF and weakly expressing CD133. Under the transmission electron microscope, W-P bodies could be seen within the EPCs cytoplasm. Biological functions showed visible EPC grew on the matrigel in a blood wessel -like form. SPCs was cultured for 14 days and showed specific features of the vascular smooth muscle growth, namely, "peak-valley" growth way. SPCs expressed CD34 and SMA without vWF and VEGF-2 expression myofilaments, paralleled with the longitudinal axis, could be seen under the electron microscope. SPCs could not form vessel-like structures on the Matrigel.
Conclusions: Mononuclear cells could be obtained through density gradient centrifugation of the bone marrow blood, which could be synchronous cultured to EPCs and SPCs with high purity, provided seed cells for Venous valve tissue engineering economical and simply.

GW25-e0838

eNOS modified endothelial progenitor cells inhibit efficiently neointima formation and enhancement of vascular function

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Objectives: Loss of endothelial NO production after arterial injury may contribute to restenosis, characterized by neointima formation and elastic recoil. Previous studies have established that bone marrow-derived endothelial progenitor cells (EPCs) play an important role in vascular repair. In this study, we investigated that hypothesis that overexpression of vasculoprotective gene endothelial nitric oxide synthase (eNOS) in EPCs may restore NO production and inhibit neointimal hyperplasia.
Methods: EPCs obtained from rat bone marrow were isolated using a Ficoll density gradient centrifugation, and expanded in endothelial basal medium. The endothelial characteristics of EPCs were identified by immunologic cell chemical staining and fluorescent labeling. EPCs were transduced with pseudotyped retroviral vectors expressing human eNOS (eNOS-EPCs) or green fluorescent protein (GFP-EPCs). eNOS or GFP modified EPCs were injected directly by intravenous tail vein after arterial injury and again 24 hours later. Two weeks after transplantation, eNOS proteins in the rat vessels were assayed by western blot. The morphology of arterial intima and media was studied by optical microscopy and image analysis system.
Results: The adherent cells were considered EPCs which had spindle shape and form blood-island-like structures during development. The adherent cells had many endothelial characteristics. Transduction efficiency of EPCs ex vivo was above 90%. eNOS gene transfer augmented EPCs proliferative activity. eNOS proteins were detected in the rat vessels. Transfused EPCs may home to the injury site and enhanced reendothelialization associated with decreased neointima formation. The antiproliferative effect of EPCs is further enhanced by overexpression of eNOS. Furthermore, eNOS overexpressed EPCs could increase significantly endothelium- dependent vasodilation function (EDVR).
Conclusions: In vitro, eNOS gene transfer enhanced EPCs proliferative activity. In vivo, eNOS overexpressed EPCs could accelerated reendothelialization and inhibit neointimal hyperplasia. The results show that gene modified EPCs facilitate the strategy of cell transplantation for vascular dysfunction and prevention of restenosis after angioplasty.

GW25-e0843

c-Met overexpression promote reendothelialization and inhibit neointimal formation after balloon injury

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Objectives: to explore the effect of c-met overexpression in EPCs on reendothelialization after balloon injury.
Methods: EPCs derived from mouse bone marrow were isolated and cultured. 3- (4, 5-dimethylthiazol-2-yl) -2, 5-diphenyltetrazolium bromide assays were used to evaluate EPC proliferation. Adenoviral vector expressing c-Met was generated using the AdEasy system. To evaluate the role of HGF/Met in vascular repair in vivo, we used balloon-injured rat carotid artery model. Evans Blue dye was administered to evaluate reendothelialization after 10 days injury, and the neointimal formation was assessed at 21 days following vascular injury.
Results: The effect of HGF on EPC proliferation was examined 48 h after exposure to different quantities of HGF (range 2-20 ng/ml). The proliferation effect was strongly dose-dependent and significantly increased in c-met-EPCs group compared with EPCs group. After transfusion of c-met-EPCs or EPCs to balloon-injured rat via vessel, Evans Blue dye was administered to evaluate reendothelialization after balloon injury. reendothelialized area was significantly larger in c-met-EPCs group than in EPCs group ($64.25\pm8.90\%$ vs. $43.21\pm7.24\%$, n=5, $P<0.01$). A marked decrease in the neointimal area and I/M ratio was found in c-met–EPCs compared with EPCs group at day 21 (0.29 ± 0.06 vs. 0.63 ± 0.13, n=5, $P<0.01$).
Conclusions: c-Met overexpression improve EPCs proliferation, promote reendothelialization and inhibit neointimal formation after balloon injury.

GW25-e0845

Baseline serum uric acid level as a predictor of cardiovascular disease related mortality and all-cause mortality: A meta-analysis of prospective studies.

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Objectives: Serum uric acid (SUA) levels have been used to predict cardiovascular and all-cause mortality event, but the data have yielded conflicting results. We investigated whether SUA was an independent predictor for cardiovascular or all-cause mortality with prospective studies by meta-analysis. Serum uric acid (SUA) levels have been used to predict cardiovascular and all-cause mortality event, but the data have yielded conflicting results. We investigated whether SUA was an independent predictor for cardiovascular or all-cause mortality with prospective studies by meta-analysis.
Methods: Pubmed and Embase were searched without language restrictions for publications available till April 2013. Only prospective studies on cardiovascular or all-cause mortality related to SUA levels were included. Pooled adjust relative risk (RR) and corresponding 95% CI were calculated separately for the highest vs. lowest category or the lowest vs. middle category.
Results: For the highest SUA, eleven studies with 172, 123 participants were identified and analyzed. Elevated SUA increased risk of all-cause mortality (RR 1.24; 95% CI 1.09-1.42) and cardiovascular mortality (RR 1.37; 95% CI 1.19-1.57). Subgroup analyses showed that elevated SUA significantly increase the risk of all-cause mortality among men (RR 1.23; 95% CI 1.08-1.42), but not in women (RR 1.05; 95% CI 0.79-1.39). Risk of cardiovascular mortality appeared to be more pronounced among women (RR 1.35; 95% CI 1.06-1.72). The association between extremely low SUA and mortality was reported in three studies; we did not perform a pooled analysis because of high degree of heterogeneity in these studies.
Conclusions: Baseline SUA level is an independent predictor for future cardiovascular mortality. Elevated SUA appears to significantly increase the risk of all-cause mortality in men, but not in women. Whether low SUA levels are predictors of mortality is still inconclusive.

GW25-e0877

Relaxin-2 and relaxin-3 inhibit high glucose-induced apoptosis in neonatal rat ventricular myocytes

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Objectives: High concentrations of glucose induce apoptosis in cardiomyocytes, and contribute to diabetic cardiomyopathy. Relaxin-2 and relaxin-3 are two members of the relaxin peptide family that are cardioprotective. In the present study, we